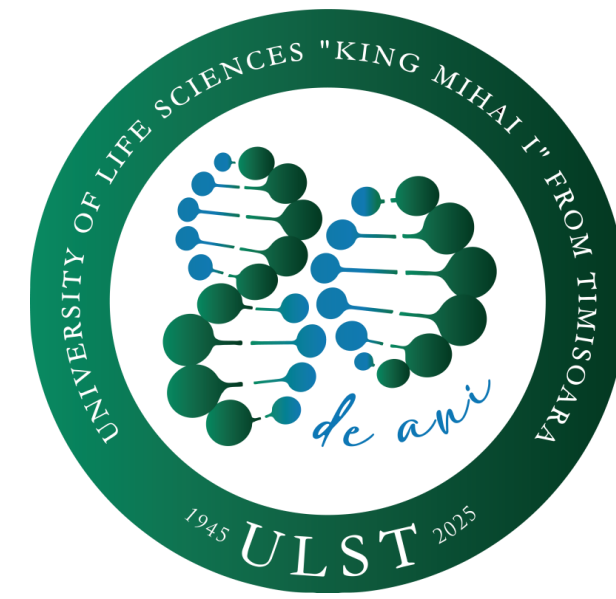




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Effects of walnut (*Juglans regia* L.) kernel meal
supplementation in ostrich diets on growth
performance and fatty acid profiles

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Abstract

This study aimed to evaluate the effects of walnut (*Juglans regia* L.) kernel meal supplementation in ostrich diets on growth performance and the chemical and lipid composition of meat. Throughout the trial, feed intake, body weight gain, and feed conversion ratio were recorded. At the end of the study, thigh and breast meat samples were collected for chemical composition and fatty acid profile analyses. Results indicated that walnut kernel supplementation did not negatively affect growth performance. Chemical analysis of meat from ostriches fed walnut kernel showed protein content of 21-22%, reduced crude fat (1.8-2.0%), moisture 74-76%, ash 1.2%, and essential minerals, including phosphorus (P) 0.25%, iron (Fe) 3.2 mg/100 g, and zinc (Zn) 2.5 mg/100 g. The fatty acid profile showed elevated concentrations of Omega-3 (0.30 g/100 g), Omega-6 (0.75 g/100 g), and Omega-9 (0.40 g/100 g), with an optimal Omega-6/Omega-3 ratio of 2.5-3:1. Long-chain polyunsaturated fatty acid synthesis, including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), was also enhanced. These findings indicate that walnut kernel can be included in ostrich diets to improve meat nutritional and lipid profiles and contribute to oxidative stress reduction in animals.



Introduction

- In the context of identifying alternative sources of plant-based proteins for animal feed, particularly for ostriches, walnut meal (*Juglans regia*) represents a resource with high nutritional value and significant antioxidant potential. According to a recent study conducted by Niyonshuti, E., and Kirkpinar, F. (2024), which evaluated the chemical composition and nutritional properties of various pressed meals—including those derived from fennel, black cumin, flaxseed, hemp, camelina, carrot, and walnut—walnut meal was distinguished by its high dry matter content (95.8%), non-nitrogen extract (45.4%), and crude protein levels exceeding 20%. Additionally, it exhibited a substantial lipid content (23–24%), findings that were corroborated by Untea, A., et al. (2025). Furthermore, walnut meal demonstrated the highest antioxidant activity among the tested samples, owing to its elevated levels of phenolic compounds (3.15 mg GAE/g) and flavonoids (2.64 mg QE/g). These characteristics suggest that walnut meal could play a beneficial role in mitigating oxidative stress in animals.



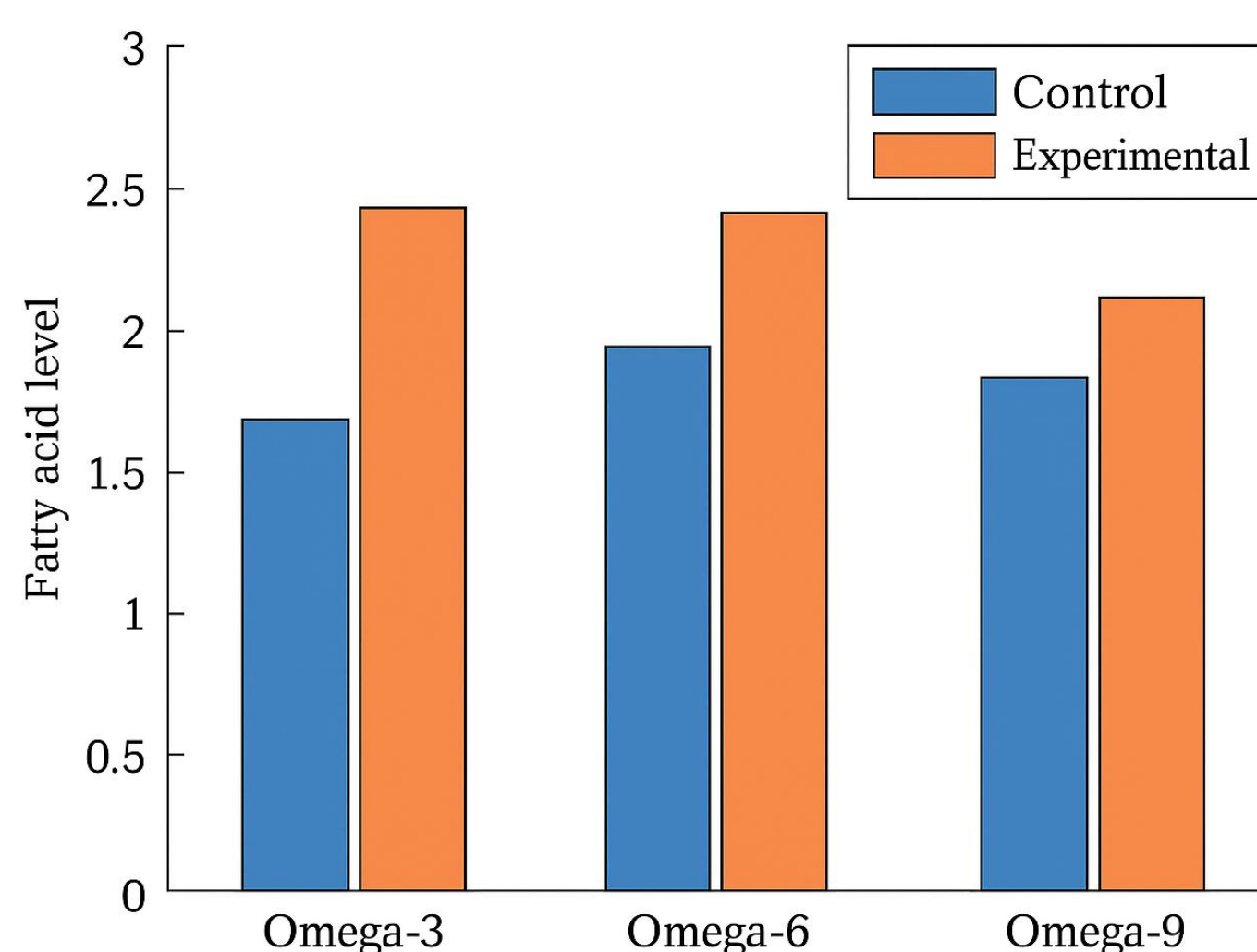
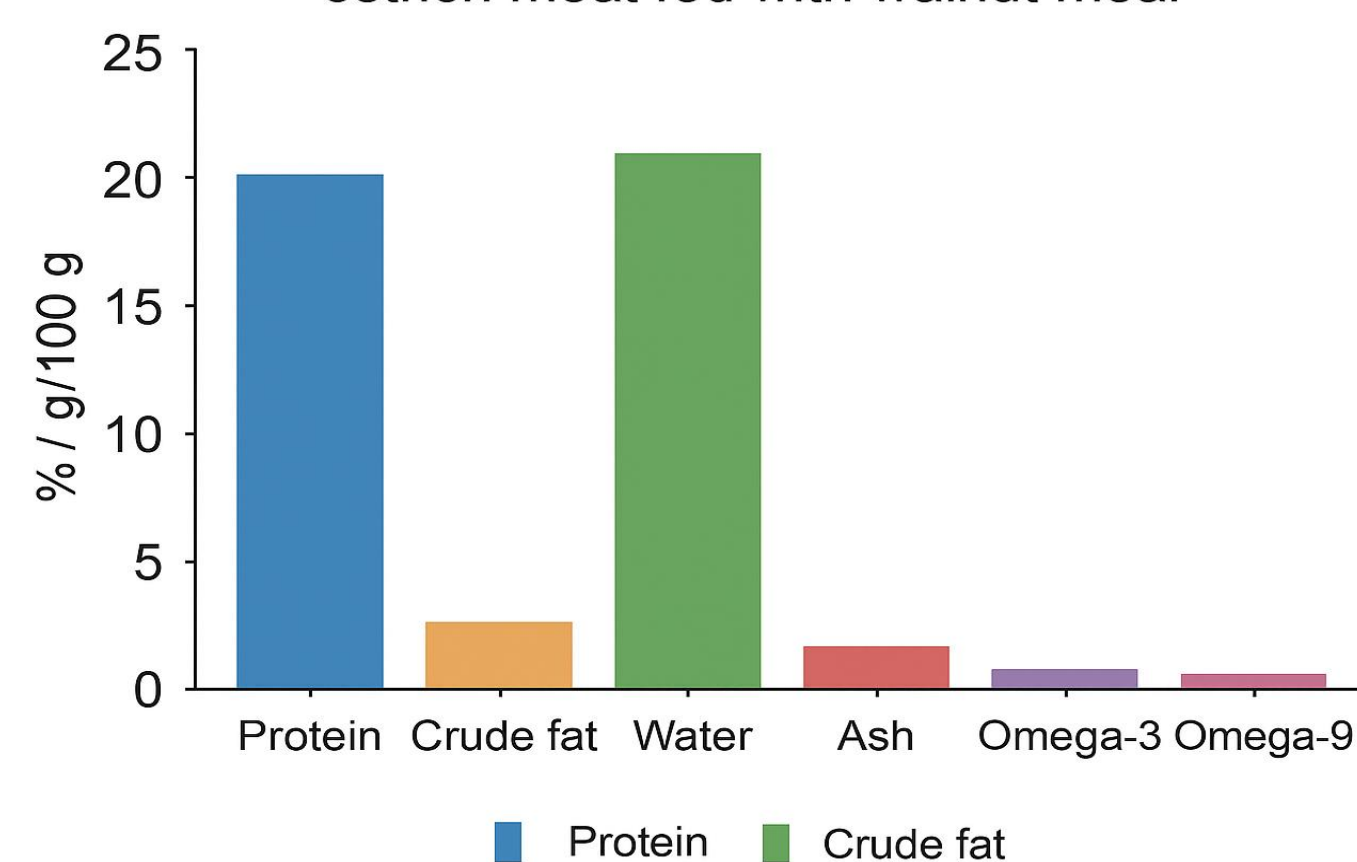
Results and discussions

- The findings revealed that dietary inclusion of walnut cake resulted in a slight reduction in final body weight relative to the control group, indicating a possible negative effect on growth rate. Nevertheless, meat composition analysis demonstrated a lower crude fat percentage (12.66% vs. 10.49%) and a marked improvement in lipid profile, reflected by higher omega-3 fatty acid concentrations (2.22% vs. 2.90%) and an improved omega-6/omega-3 ratio (3.28 vs. 2.66). Furthermore, the diet stimulated the biosynthesis of long-chain polyunsaturated fatty acids, including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), enhancing the nutritional value of the meat for human consumers.
- The observed increases in omega-3 (0.30 g/100 g), omega-6 (0.75 g/100 g), and omega-9 (0.40 g/100 g) fatty acids, along with the optimal omega-6/omega-3 ratio of 2.5–3:1, indicate a favorable environment for the enzymatic conversion processes involved. These conditions likely facilitate the biosynthesis of long-chain derivatives from precursors such as alpha-linolenic acid (ALA) and linoleic acid (LA). Moreover, the stimulation of these pathways may contribute to an improved lipid profile and cardiovascular function, potentially exerting beneficial effects on overall health.

Material and method

- Fourteen juvenile ostriches (*Struthio camelus* var. *domesticus*), aged 6–9 months, were reared under semi-intensive conditions at the "Ograda cu struți" farm, Sebeș, Alba County, Romania, with ad libitum access to feed and water. Birds were randomly assigned to two groups (n = 7 each): a control group receiving the standard diet and an experimental group receiving the standard diet supplemented with 5% walnut kernel. The trial lasted 8 weeks, during which body weight, daily weight gain, and feed and water intake were recorded. Health and behavior were monitored daily to ensure animal welfare.
- Data were analyzed using descriptive and inferential statistics, with group differences assessed by ANOVA and t-tests at a significance level of $p < 0.05$.

Chemical composition and fatty acid profile of ostrich meat fed with walnut meal



Conclusions

- The inclusion of walnut cake in ostrich diets resulted in a slight reduction in final body weight, indicating a modest negative effect on growth performance. Meat composition analysis showed a reduction in crude fat and a marked improvement in the lipid profile, including increased omega-3 fatty acid concentrations, stimulation of EPA and DHA synthesis, and an optimized omega-6/omega-3 ratio. Walnut cake can serve as a functional ingredient in ostrich diets, enhancing meat nutritional value and providing essential fatty acids beneficial for human consumption. Controlled inclusion of walnut cake, aligned with the energy and protein balance of the diet, allows optimization of body fat composition without significantly compromising productive performance.
- Overall, walnut cake represents a promising option for improving the quality of ostrich meat products, offering nutritional benefits and potential advantages for consumer health.



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Acknowledgement

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